

# CENTRODIES

# CENTRONE 5

## MODEL 739-1/739-2

## PRINTER

374D0911 REV A

APRIL 1981

# CEMIKULS

# CENTRONICS

# CENTRODIES

# CENTRONICS

# OPERATORS MANUAL



# WARNING

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- reorient the receiving antenna
- relocate the computer with respect to the receiver
- move the computer away from the receiver
- plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

JANUARY 1, 1981

APPROVED, CLASS B

NOTE: This FCC statement pertains to the 739-1 only.



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# SECTION 1

## GENERAL INFORMATION

### 1.1 SCOPE OF THIS MANUAL

This manual contains information for the installation, operation and operator-level maintenance of the 739-1 and 739-2 printers. Differences between the two models are noted whenever appropriate. Refer to paragraph 1.3 for detailed specifications.

### 1.2 DESCRIPTION

**GENERAL**—The Model 739 is an operationally simple, compact, dot-matrix printer that prints monospaced and proportional characters in line lengths up to 8 inches. Pin-addressable graphics of six vertical dot positions per character are available through host control. Printing is performed in the forward direction at a speed of 10 inches per second. The high-density dot pattern and true descenders produce high-quality characters. Complete sets of character styles are included in this section.

The monospace pattern is a  $7 \times 8$  dot matrix, while proportional characters are formed by up to 9 vertical and 6-18 horizontal dots. Monospaced and proportional character sets consist of 96 ASCII characters each. Monospaced characters may be printed 10 characters per inch (cpi) or 16.7 cpi, providing 80 column or 132 column format for business applications. Proportional characters may be right justified under host control. Control codes are contained in Section 3.

**COUNTRY SELECT**—The Model 739 features character sets for six countries: The United States of America, France, United Kingdom, Germany, Italy and Sweden/Finland. The character set is selected by a switch pack setting. When power is turned on, the printer logic recognizes the switch settings and prepares to print characters for that country.

**ELONGATED CHARACTERS**—The 10 cpi, 16.7 cpi and proportional characters can be elongated beginning and ending anywhere within a line by host-generated control codes. Elongated characters are printed double-width, thus only half as many elongated characters can fit on a line.

**PAPER HANDLING**—The printer's three-way paper handling system accommodates the following types of paper:

1.  $9\frac{1}{2}$ " wide standard computer fanfold forms, using adjustable pinfeed pins (228.6 mm  $\pm 1$  mm) to ensure paper registration. Paper can be single or multipart up to three parts.
2. Rolled paper,  $8\frac{1}{2}$ " wide, 1" core and up to 5" diameter. The printer includes a roll paper holder. With rolled paper, a built-in rip-and-read cutting edge allows removal of paper within 15 lines of the last line printed.
3. Single sheets of  $8\frac{1}{2}$  inch wide paper, hand fed as with an ordinary typewriter.

### OTHER SIGNIFICANT FEATURES

- Automatic line feed enable; switchable.
- Host-controlled forward and reverse paper feed in full-line and half-line increments.
- Self test of ASCII characters.
- Underscore capability.
- Superscript and subscript capability.
- Host-controlled backspace capability.
- Top of form.
- Paper out switch.
- Quietized acoustic cover.

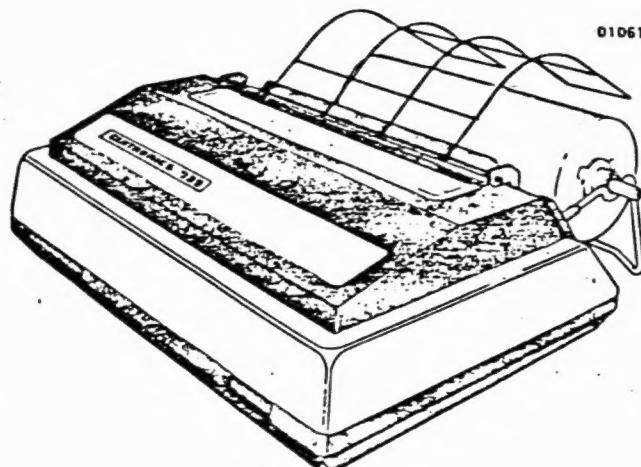


Figure 1-1 739 Printer with Roll Paper



## 1.3 SPECIFICATIONS

Printing Speed .....	100 characters/second (monospaced); 80 cps (proportional); 371 dots/second (graphics)
Characters Per Line .....	80 maximum (10 cpi); 132 maximum (16.7 cpi)
Print Width .....	8 inches (204 mm) maximum
Character Structure .....	7 x 8 Dot Matrix (Monospaced) N x 9 Dot Matrix (Proportionally Spaced)
Graphics .....	6 dots high, 594 dot positions per line (8 inches)
Line Feed Buffer .....	Capacity for 255 pending line feeds
Line Feed Repeat Rate .....	12 line feeds/second
Vertical Spacing .....	6 lines per inch (normal line feed) $\frac{1}{6}$ for inch
Horizontal Spacing .....	Monospaced: 10 or 16.7 characters per inch (cpi) Proportional: 8.2 to 24.6 cpi depending on text; 13 to 14.5 cpi average density. Numerics are monospaced at 12.5 cpi for tabulation.
Parallel Data Input Connector .....	40-pin PC edge connector
Code Structure .....	Standard US ASCII; 7 bits, parallel
Input Data Rate .....	Up to 2,200 characters/second
Character Sets* .....	Primary: 96 US ASCII monospaced characters. Secondary: 96 US ASCII proportionally-spaced characters.
Input Voltage/Frequency .....	(739-1) 120 Vac +5%, -10%; 60 Hz $\pm 1$ Hz (739-2) 230 Vac +10%, -5%; 50 Hz $\pm 1$ Hz
Power Requirements .....	100 watts, maximum
Size .....	14-1/2" W x 11" D x 5" H; (368 mm) x (279 mm) x (127 mm)
Weight .....	12 lbs. (5.4 Kg)
Ribbon (12 per box) .....	15 Yard Zip-Pack mobius loop (Centronics Part No. 63701712-6001)
Paper Handling .....	Cut sheets, 8 1/2" (21.6 mm) wide Rolls 3 1/2" to 8 1/2" (88.9 to 21.6 mm) W x 5" (127 mm) diameter; 1" (25.4 mm) core; 3 ply maximum Fanfold 228 mm (9") pin to pin; adjustable $\pm 1$ mm

\* The 739 has switch-selectable country character sets for USA, France, United Kingdom, Germany, Italy and Sweden/Finland (Character Set A).

## 1.4 PRINCIPLES OF OPERATION

All logic, control, drive and power supply circuits are contained on one printed circuit board (Figure 1-2). The print mechanism rides on a carriage driven by a DC motor. The printing is performed in the forward direction only, printing up to nine dots per column. The paper feed (line feed) rollers are driven by a stepping motor which is capable of forward and reverse line feed; manual and

computer-controlled. The ribbon drive (AC motor) moves ribbon past the print head at all times except when the carriage actuates the sensor at the leftmost carriage position. The power supply provides +5V regulated for the logic, +5V EXT for host device sense, +12V regulated for motor control, +17V unregulated for solenoid and motor drive, and 24 Vac for the ribbon motor. +17V and -17V are also provided for external use.



**ELONGATED CHARACTERS**—Elongated characters in all three character styles are initiated using the ESC, SO control code sequence and terminated using the ESC, SI control code sequence. Printing of elongated characters may be initiated and terminated within a line, which allows intermixing of normal and elongated

characters within lines. Printing of elongated characters is automatically terminated at the end of a line. Carry-over of elongated characters to the next line must be accomplished by using the ESC, SO code sequence preceding the character data for the next line.

#### PROPORTIONAL NORMAL

01070

```
!"#$%&'()*+,-./0123456789:;<=>?  
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_  
'abcdefghijklmnopqrstuvwxyz()
```

#### PROPORTIONAL ELONGATED

```
!"#$%&'()*+,-./0123456789:;<=>?  
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_  
'abcdefghijklmnopqrstuvwxyz()
```

#### 10 CPI NORMAL

```
!"#$%&'()*+,-./0123456789:;<=>?  
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_  
'abcdefghijklmnopqrstuvwxyz()
```

#### 10 CPI ELONGATED

```
!"#$%&'()*+,-./0123456789:;<=>?  
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_  
'abcdefghijklmnopqrstuvwxyz()
```

#### CONDENSED (16.7 CPI) NORMAL

```
!"#$%&'()*+,-./0123456789:;<=>?  
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_  
'abcdefghijklmnopqrstuvwxyz()
```

#### CONDENSED (16.7 CPI) ELONGATED

```
!"#$%&'()*+,-./0123456789:;<=>?  
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_  
'abcdefghijklmnopqrstuvwxyz()
```

Figure 1-3 Character Styles (USA)



Table 1-1 Country Character Set "A"

COUNTRY	043	044	100	133	134	135	136	140	173	174	175	176
U.S.A.	#	\$	@	[	\	]	^	'	<	1	>	~
FRANCE	£	\$	à	-	ç	é	^	'	é	ù	è	..
U.K.	£	\$	@	[	\	]	^	'	<	1	>	~
GERMANY	#	\$	ä	ö	ü	^	'	ä	ö	ü	ß	
ITALY	£	\$	—	é	í	^	ú	á	ó	é	í	
SWED/FIN	#	×	£	ä	ö	å	ü	é	ä	ö	å	ú

Note: Codes are in octal. See Figure 2-7 for switch settings.

## 1.6 GRAPHICS

The graphics function is entered by the sequence **ESC%0** (27, 37, 48 decimal) and is terminated by any proper escape sequence, such as **ESC DC1** (select proportional).

Graphics are formed by a six-pin vertical pattern, using one-half line spacing so that a solid graphic pattern is possible due to the dot overlap. After 594 bytes of graphic data are received by the printer, a one-half line feed and a carriage return is automatically generated. Printing speed for graphics is 5 inches per second. Dot density is 75 dots/inch horizontal and 72 dots/inch vertical.

**GRAPHIC SAMPLES**—Graphic samples are included below.

## 1.7 OPTIONAL FEATURES

**CHARACTER SET "B"**—A set of PROM's containing four character sets is available as an option. The countries are USA, Spain, Denmark/Norway and Portugal/Brazil.

**CHARACTER SET "C"**—Set "C" consists of character sets for USA and Greece.

## 1.8 ACCESSORIES

**PRINTER MINI-EXERCISER (66003100-4001)**—The mini-exerciser is a self-contained unit and includes an integral connector with two switches to control line length and different character formations. In combination the two switches produce four test sequences. An adapter cable (P/N 63669343-4001) is required to fit the edge connector on the 739.

**TOOL KIT (63002399-6001)**—A tool kit containing all the necessary tools (screwdrivers, nut drivers, pliers, etc.) to maintain the printer is available to the user.

01071

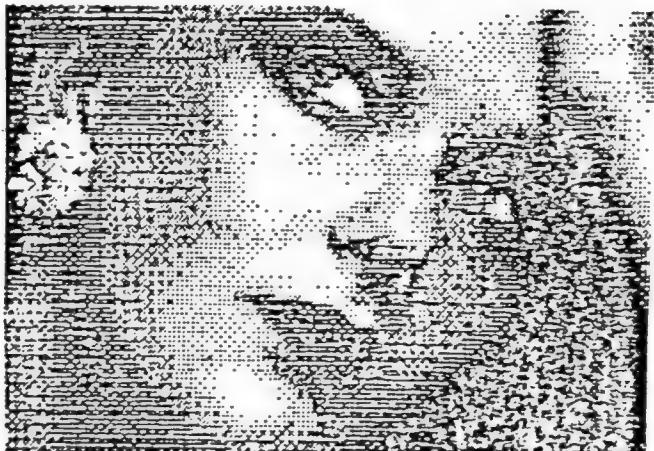
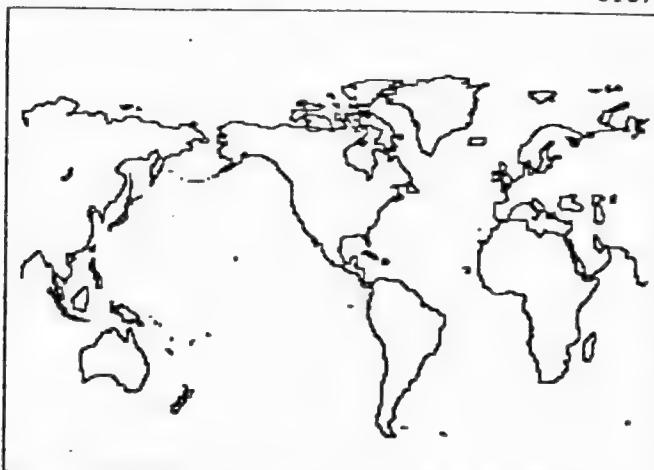


Figure 1-4 Graphic Samples



# SECTION 2 INSTALLATION

## 2.1 PRINTER INSPECTION

Visually inspect the printer for signs of damage received during shipment. Immediately notify the common carrier of any discrepancies.

## 2.2 SET-UP PROCEDURES (Figure 2-1)

1. Remove the top cover, manually move the print head back and forth and check that the ribbon is feeding properly. Handle the print head carefully as shown in Figure 2-7.
2. Install one of three types of paper as described in paragraph 2.3.
3. Place POWER switch in the OFF position and place ONLINE/LOCAL switch in LOCAL position.

### CAUTION

When turning power on or off, always place switch in LOCAL position to prevent erroneous communications and/or loss of data.

4. Check country character setting on DIP switch as shown in Figure 2-7.

### CAUTION

Use care when setting DIP switches. Any damage to the printer caused while setting the switches (during the warranty period) may void the warranty.

5. Connect interface cable to printer and host device.
6. Connect the power cord to a 3-wire, grounded AC outlet.
7. Place POWER switch in ON position and ensure that LED illuminates through the paper exit slot.
8. Place ONLINE/LOCAL switch in ONLINE position to enable printer to receive data.

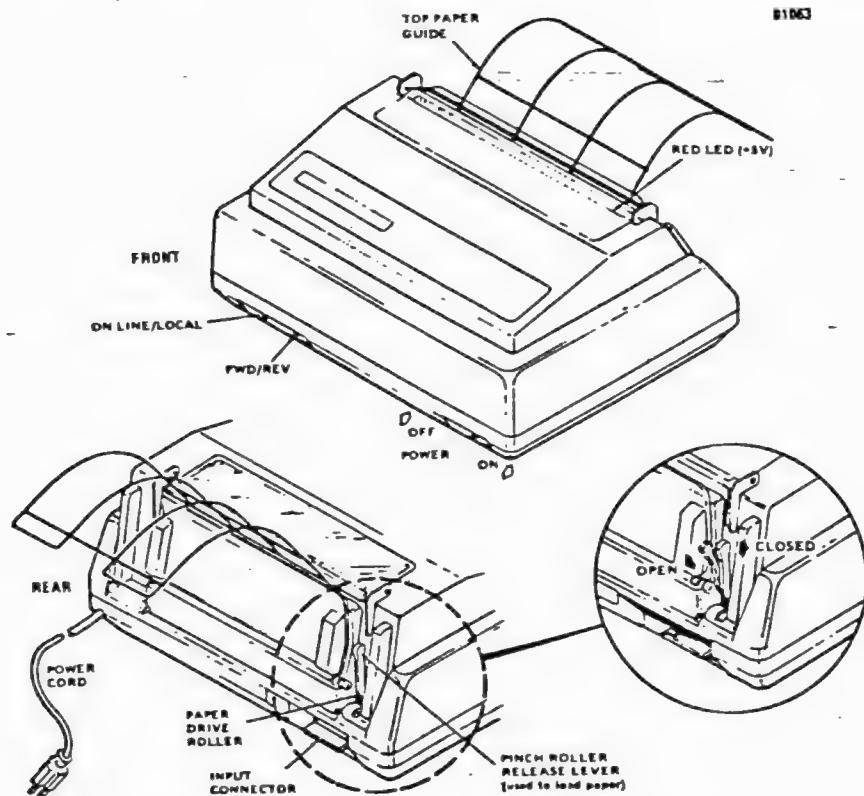


Figure 2-1 Set-Up Procedures



## 2.3 PAPER INSTALLATION

The printer can handle three types of paper; fan-fold, roll and single sheet. Vertical line registration can vary depending on the type of paper used. To select the ideal type of paper for your application, consider the following guidelines.

### PAPER APPLICATION GUIDELINES

1. **Fanfold Paper:** Precise line registration, 6 lines to the inch, can best be maintained using continuous fanfold edge perforated paper. Fanfold paper should be used whenever line registration is critical such as in preprinted form applications.
2. **Roll Paper/Single Sheet:** In pinch feed applications, when using roll paper or single sheet paper, the line spacing can vary depending on the finish and weight of the paper. Check the paper for your application before procurement or use of preprinted forms.
3. **Single Sheet:** The last line can be printed up to 1.6 inches (40.6mm) from the bottom of the page when using single sheet paper.

Refer to the appropriate procedure to install fan-fold paper, roll paper or single sheets.

### ROLL PAPER INSTALLATION

1. Set the printer on a flat surface with enough room in back of the printer for the roll paper holder.
2. Refer to Figure 2-2 and squeeze the roll paper holder support arms together slightly.
3. Insert support arms into two holes provided at rear of printer and release support arms.
4. Remove core hub from plain end and insert roller through standard 1-inch paper roll core and place roll on holder as shown with paper feeding from bottom of roll.
5. Remove top cover by lifting rear edge until latches are clear of main cover and then slide cover back to disengage front clips.
6. Retract head to the paper/ribbon load position by rotating head release lever fully counterclockwise. See Figure 2-5 for lever detail.
7. Push the pinch-roller release lever towards rear of printer. (Figure 2-1).

8. Feed the paper into the rear slot and under the paper drive roller.

9. Align the edges of the free end of paper with paper-drive roller edges and straighten as required.

10. Remove any skew between paper roll and the paper-drive roller by sliding the roll on the holder axle to align the paper as shown in Figure 2-3.
11. Push the pinch-roller release lever forward to secure paper.
12. Advance paper into printer by turning either thumbwheel until paper exits through the top of the printer.
13. Check ribbon position, remove slack if necessary, move head-release lever to print position, and install top cover. Print position numbers on print head assembly (Figure 2-5) indicate basic setting for number of plies of paper. Note that head-release lever setting (1, 2 or 3) may vary depending upon type of paper being used.

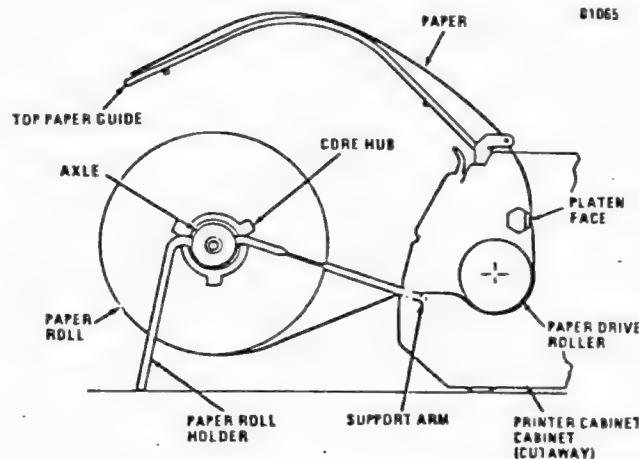
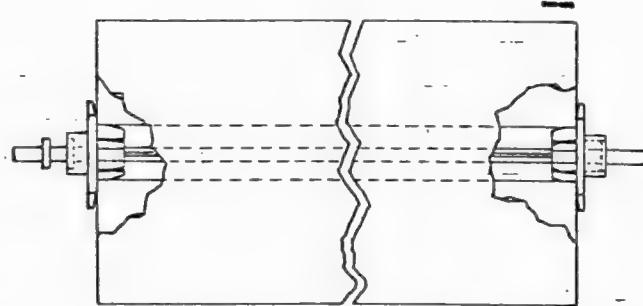
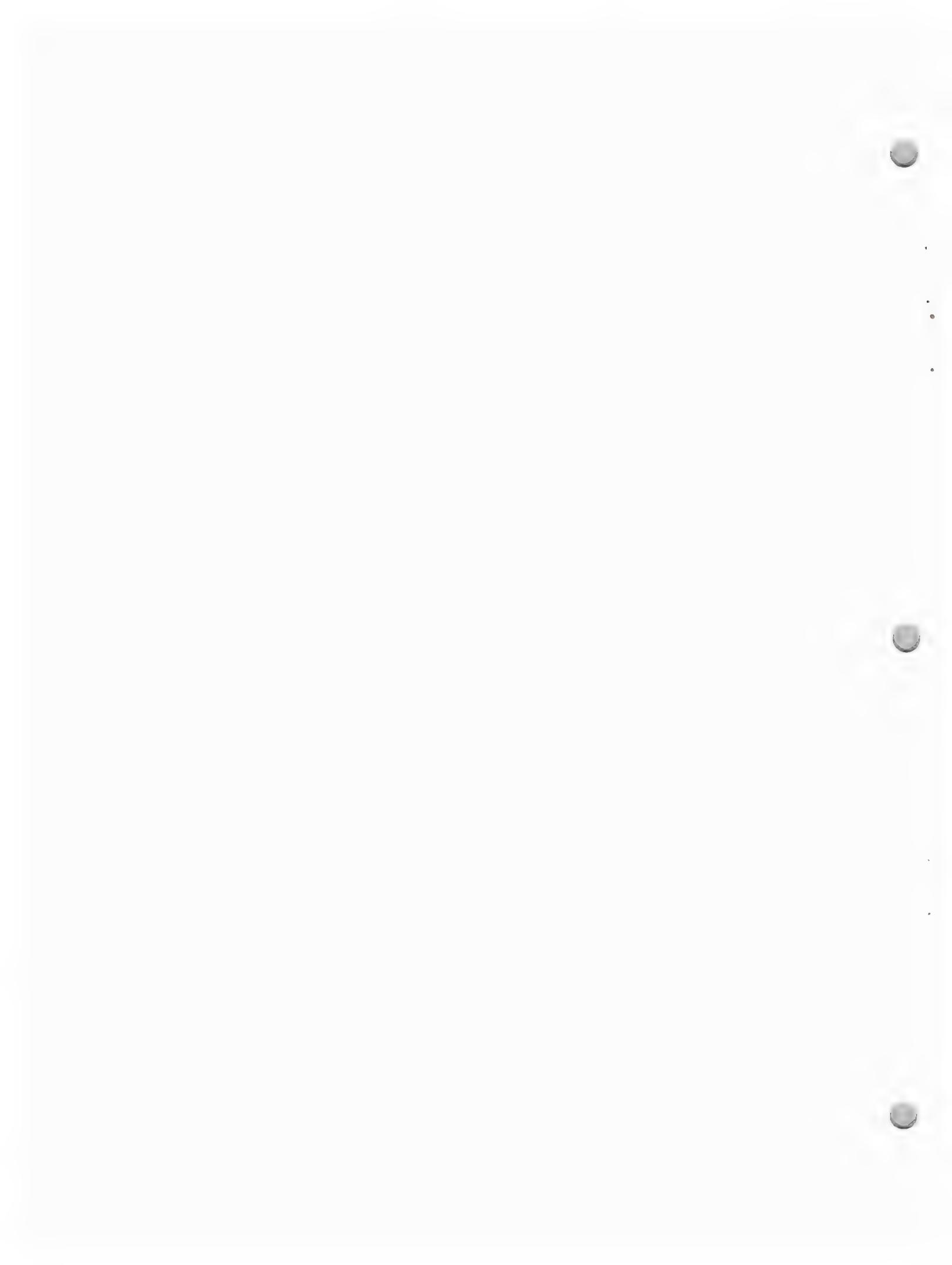


Figure 2-2 Roll Paper Holder Installation



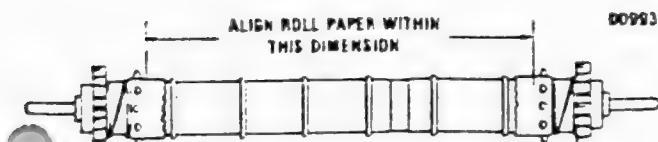


Figure 2-3 Paper Drive Roller

#### FANFOLD PAPER

1. Remove the top cover, retract head and ensure release lever is in rear (open) position.
2. Engage paper onto pins of paper drive roller at bottom rear of printer.
3. If paper holes do not line up with pins on paper drive roller, refer to Figure 2-4 and adjust per steps 4, 5 and 6. If lineup is satisfactory, go to step 7.

#### NOTE

The cam slot with the shaded area in Figure 2-4 is the "HOME" position (228.6 mm or 9" for the short version; 238.6 mm or 9.4" for the long version). The printer is shipped with the roller pins in the "HOME" position. While adjustment is being made, Index Pin MUST stay in Index Slot. Also, make certain that Cam Pin falls securely into Cam Slot.

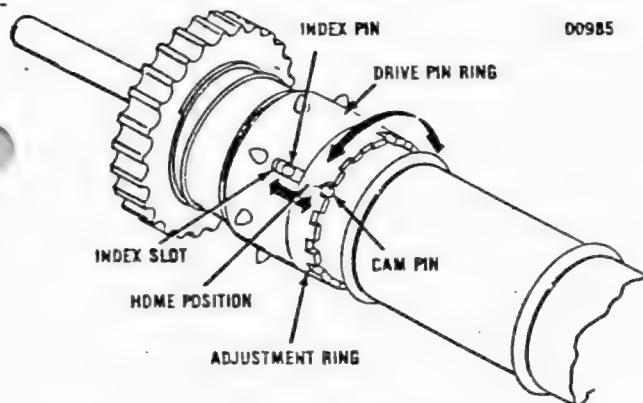


Figure 2-4 Paper Drive Roller Adjustment

4. Grasp drive pin ring and adjustment ring at one end of paper drive roller and slide towards end of roller.
5. With paper drive roller spring compressed, rotate adjustment ring to a deeper slot to reduce pin distance or to a shallower slot to increase pin distance.
6. Repeat steps 4 and 5 at other end of paper drive roller if necessary.
7. Hold paper in place while turning either thumbwheel until the paper exits through the top of the printer.

8. Ensure the paper supply is feeding properly.

9. Check ribbon position, remove slack if necessary; move head-release lever to appropriate print position and install top cover. Print position numbers on print head assembly indicate head release lever positions for number of plies of paper as a general rule. Note that the print-head position may vary depending upon type of paper being used.

#### NOTE

When using fanfold type paper, the pinch roll release lever should be left in the open position (away from printer).

#### SINGLE SHEETS

1. Push pinch-roller release lever towards rear of printer to the open position and open hinged paper chute for top loading.
2. Insert top edge of sheet into paper chute.
3. Slide sheet down the chute, under paper drive roller until sheet rises through paper-exit slot.
4. Match up top and bottom edges of paper. Straighten paper as required (normally, chute will guide paper properly without need to straighten).
5. Pull pinch-roller release lever forward to closed position and close paper chute.
6. Manually turn two thumbwheels until sheet is in position for the first printed line.

## 2.4 RIBBON REPLACEMENT

The printer uses a 180° mobius loop ribbon configuration that allows printing on upper and lower portions of the ribbon on alternate passes, thus increasing ribbon life. Ribbon replacement is as follows:

1. Remove top cover to gain access to ribbon tray. Refer to Figure 2-6.
2. Retract the print head by rotating head release lever fully counter-clockwise. See Figure 2-5 for lever detail.
3. Move the spring-loaded driven roller away from the driver roller and lift old ribbon out of the rollers. Refer to Figure 2-6 (top).



4. Unthread and discard old ribbon.
5. Remove Zip-Pack ribbon from plastic bag.
6. Place Zip-Pack ribbon in printer tray as illustrated in Figure 2-6.
7. Pull ribbon out from both ends of Zip-Pack and thread according to ribbon threading diagram, ensure mobius loop is positioned on left side of tray.

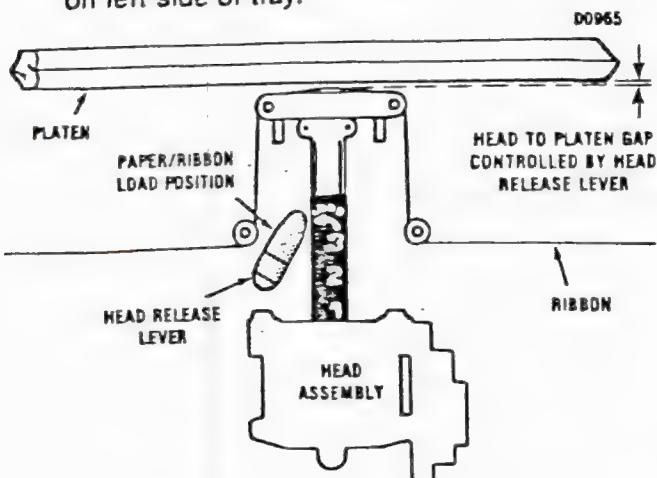


Figure 2-5 Head Release Lever Detail

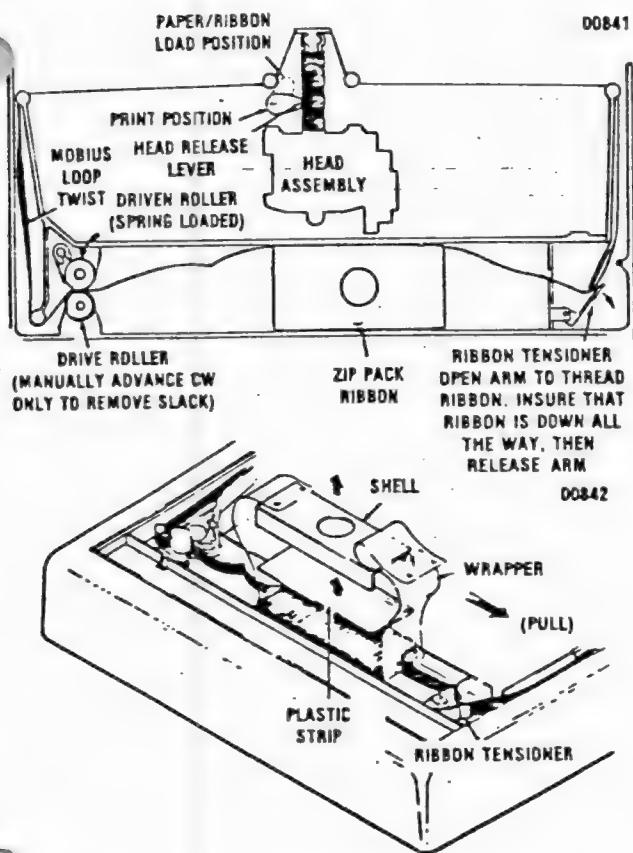


Figure 2-6 Ribbon Replacement

8. Hold ribbon in place by pressing down on plastic strip through hole in shell piece and then remove wrapper.
9. Remove and discard shell and plastic strip.
10. Manually advance drive roller clockwise until slack is removed from roller.
11. Reposition print head and install top cover.

## 2.5 COUNTRY SET SELECT; SELF TEST; AUTO LINE-FEED ENABLE

See CAUTION in paragraph 2.2. The 739 can print character sets for six countries: U.S.A., France, United Kingdom, Germany, Italy and Sweden/Finland. The character sets are selected by setting switch positions 1, 2 and 3 of DIP switch 1 on the logic PCB. To select a specific character set locate S5 in Figure 2-7, and set switch positions 1, 2 and 3 according to the table.

The self test switch positions are shown in Figure 2-7. See paragraph 5.5 for self-test instructions.

Automatic line feed after a CR (Carriage Return) is activated by S5, Switch 4 ON.

### CAUTION

Use care when setting DIP switches. Any damage to the printer caused while setting the switches (during the warranty period) may void the warranty.

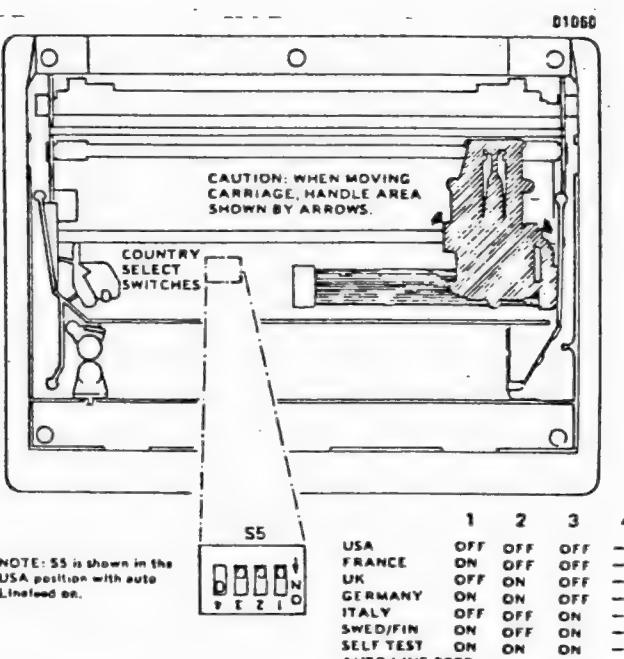
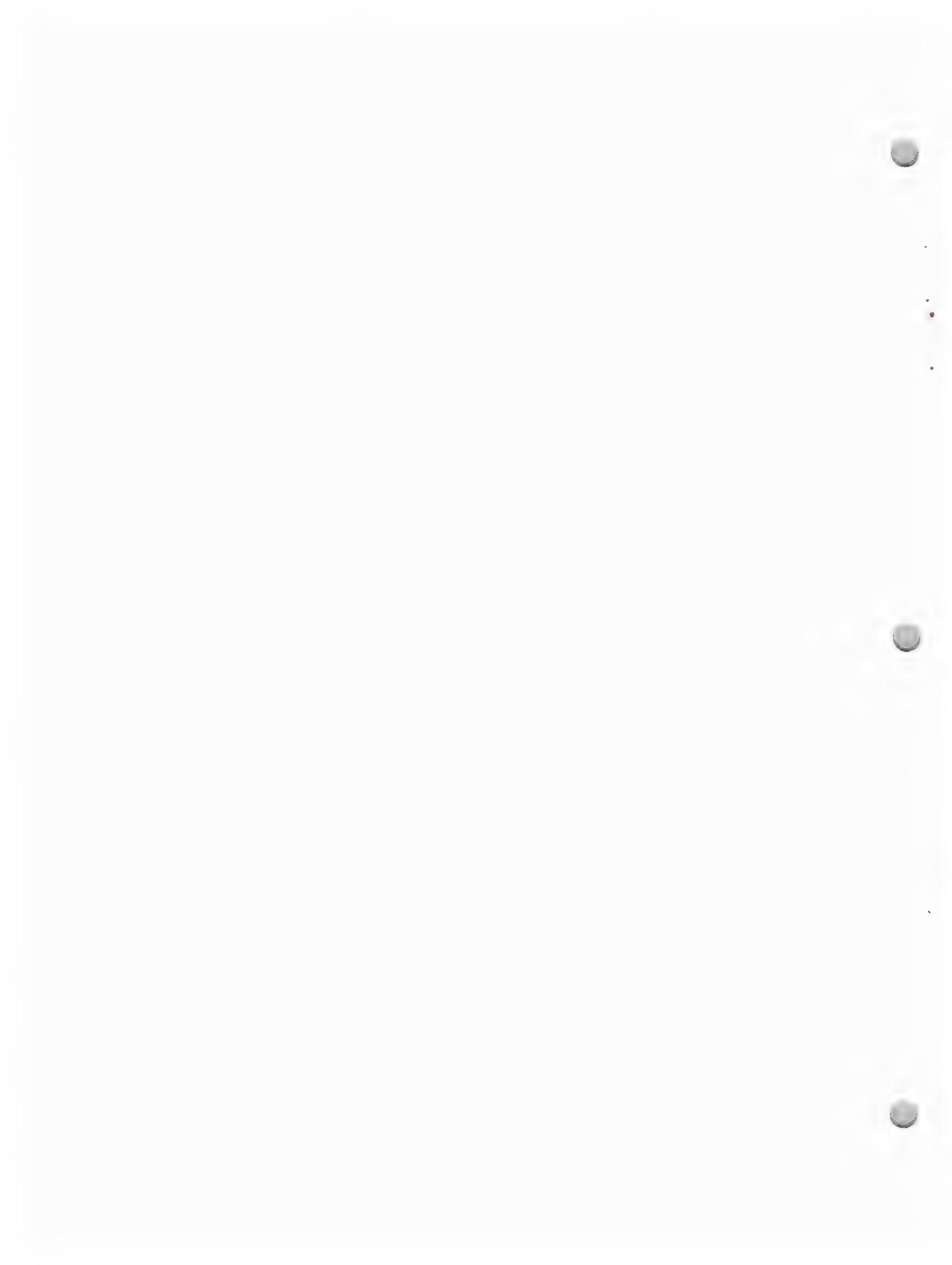


Figure 2-7 Country Set Select; Self Test; Auto Line-Feed Enable



# SECTION 3

## INTERFACE INFORMATION

### 3.1 PRINTER INTERFACE

A 40-pin printed circuit edge card connector located at the left rear of the printer provides the means for connecting the printer to the host device. A mating connector for preparing a customer supplied interface cable may be procured from Centronics (P/N 31230032-1001). Two alternate mating connectors are 3M (P/N 3464-0001) and T & B Ansley (P/N 609-4015M). The physical and electrical characteristics, pin orientation, and connector pin-outs (Table 3-1) of the printer interface connector are shown below.

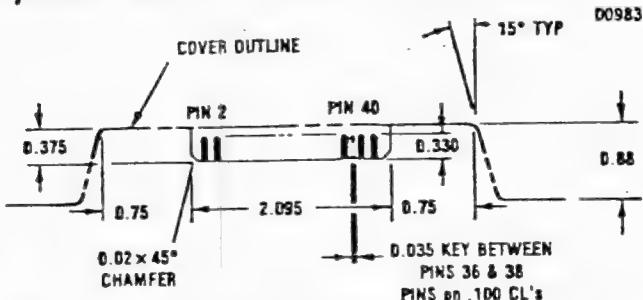


Figure 3-1 Top View, Printer Interface Connector

Table 3-1 Printer Interface Connector Pin-Outs

PIN	SIGNAL	(ATARI 850)	PIN	SIGNAL
1	DATA STROBE	— 1	2	Twisted Pair Ground
3	REP Data Bit 1	— 2	4	Twisted Pair Ground
5	ORANGE Data Bit 2	— 3	6	Twisted Pair Ground
7	YELLOW Data Bit 3	— 4	8	Twisted Pair Ground
9	GREEN Data Bit 4	— 5	10	Twisted Pair Ground
11	BLUE Data Bit 5	— 6	12	Twisted Pair Ground
13	PURPLE Data Bit 6	— 7	14	Twisted Pair Ground
15	GRAY Data Bit 7	— 8	16	Twisted Pair Ground
17	YELLOW/BLACK Data Bit 8	— 15	18	Twisted Pair Ground
19	ACKNOWLEDGE	—	20	Twisted Pair Ground
21	WHITE BUS/STP/BUSY	— 13	22	Twisted Pair Ground
23	Not Used	—	24	Twisted Pair Ground
25	ON-LINE (SELECT)	—	26	Not Used
27	WHITE Signal Ground	— 11	28	+5V (FAULT) → 12
29	Not Used	—	30	Ground
31	Signal Ground	—	32	Pin 32 jumpered
33	Not Used	—	34	to pin 34
35	+5V SIGNAL	—	36	DEMAND
37	+17V	—	38	—17V
39	+17V	—	40	Not Used

See Figure 3-3 for Interface Timing Waveforms

739 PIN 35 gives +5V signal to <sup>Printer</sup> Stop interface Pin 18.



### 3.4 ASCII CODES: PROPORTIONAL WIDTHS

Table 3-2 contains the 96 ASCII characters for the USA set, along with octal codes. Width values in the table are for proportional only. Table 3-3 contains the set "A" variable characters and octal codes for the 739.

Table 3-4 contains a numerical cross-reference to four number systems: hexadecimal, decimal, octal and binary for the user's convenience. Note that octal 177 (DELETE) is not active in the 739 printer.

Table 3-2 US ASCII Characters

00966

CODE CHAR WIDTH *	040 Space 7	041 ! <td>042 :<td>043 #<td>044 \$<td>045 %<td>046 &amp;<td>047 Acute 7</td></td></td></td></td></td>	042 : <td>043 #<td>044 \$<td>045 %<td>046 &amp;<td>047 Acute 7</td></td></td></td></td>	043 # <td>044 \$<td>045 %<td>046 &amp;<td>047 Acute 7</td></td></td></td>	044 \$ <td>045 %<td>046 &amp;<td>047 Acute 7</td></td></td>	045 % <td>046 &amp;<td>047 Acute 7</td></td>	046 & <td>047 Acute 7</td>	047 Acute 7	
CODE CHAR WIDTH	050 ( <td>051 )<td>052 :<td>053 +<td>054 Comma 7</td><td>055 Hyphen 12</td><td>056 Period 7</td><td>057 Slash 12</td></td></td></td>	051 ) <td>052 :<td>053 +<td>054 Comma 7</td><td>055 Hyphen 12</td><td>056 Period 7</td><td>057 Slash 12</td></td></td>	052 : <td>053 +<td>054 Comma 7</td><td>055 Hyphen 12</td><td>056 Period 7</td><td>057 Slash 12</td></td>	053 + <td>054 Comma 7</td> <td>055 Hyphen 12</td> <td>056 Period 7</td> <td>057 Slash 12</td>	054 Comma 7	055 Hyphen 12	056 Period 7	057 Slash 12	
CODE CHAR WIDTH	060 0 12	061 1 12	062 2 12	063 3 12	064 4 12	065 5 12	066 6 12	067 7 12	
CODE CHAR WIDTH	070 8 12	071 9 12	072 : <td>073 ;<td>074 &lt;<td>075 =<td>076 &gt;&gt;<td>077 ?</td></td></td></td></td>	073 ; <td>074 &lt;<td>075 =<td>076 &gt;&gt;<td>077 ?</td></td></td></td>	074 < <td>075 =<td>076 &gt;&gt;<td>077 ?</td></td></td>	075 = <td>076 &gt;&gt;<td>077 ?</td></td>	076 >> <td>077 ?</td>	077 ?	
CODE CHAR WIDTH	100 @ <td>101 A 16</td> <td>102 B 15</td> <td>103 C 14</td> <td>104 D 16</td> <td>105 E 14</td> <td>106 F 14</td> <td>107 G 16</td>	101 A 16	102 B 15	103 C 14	104 D 16	105 E 14	106 F 14	107 G 16	
CODE CHAR WIDTH	110 H 16	111 I 10	112 J 14	113 K 16	114 L 14	115 M 18	116 N 16	117 O 16	
CODE CHAR WIDTH	120 P 14	121 Q 14	122 R 15	123 S 12	124 T 14	125 U 16	126 V 16	127 W 18	
CODE CHAR WIDTH	130 X 16	131 Y 16	132 Z 10	133 [ <td>134 \<td>135 ]<td>136 \\<td>137 A Underline 12</td></td></td></td>	134 \ <td>135 ]<td>136 \\<td>137 A Underline 12</td></td></td>	135 ] <td>136 \\<td>137 A Underline 12</td></td>	136 \\ <td>137 A Underline 12</td>	137 A Underline 12	
CODE CHAR WIDTH	140 Grave 7	141 ` <td>142 _<td>143 `<td>144 `<td>145 `<td>146 `<td>147 `<td>147</td></td></td></td></td></td></td>	142 _ <td>143 `<td>144 `<td>145 `<td>146 `<td>147 `<td>147</td></td></td></td></td></td>	143 ` <td>144 `<td>145 `<td>146 `<td>147 `<td>147</td></td></td></td></td>	144 ` <td>145 `<td>146 `<td>147 `<td>147</td></td></td></td>	145 ` <td>146 `<td>147 `<td>147</td></td></td>	146 ` <td>147 `<td>147</td></td>	147 ` <td>147</td>	147
CODE CHAR WIDTH	150 h 12	151 i 8	152 j 6	153 k 12	154 l 8	155 m 16	156 n 12	157 o 12	
CODE CHAR WIDTH	160 p 12	161 q 12	162 r 10	163 s 12	164 t 10	165 u 12	166 v 12	167 w 16	
CODE CHAR WIDTH	170 x 12	171 y 12	172 z 10	173 { <td>174   Rule 7</td> <td>175 }<td>176 ~<td>177 NO-OP 0</td></td></td>	174   Rule 7	175 } <td>176 ~<td>177 NO-OP 0</td></td>	176 ~ <td>177 NO-OP 0</td>	177 NO-OP 0	

\*Width values in table are for proportional

Table 3-3 Variable Characters for Country Set "A"

00967-A

COUNTRY*	043	044	100	133	134	135	136	140	173	174	175	176
U.S.A	#	\$	@	£	\	]	^	'	<	I	>	~
FRANCE	£	\$	à	ô	ç	é	^	'	é	ù	è	..
U.K.	£	\$	@	£	\	]	^	'	<	I	>	~
GERMANY	#	\$	ß	ä	ö	ü	^	'	ä	ö	ü	ß
ITALY	£	\$	ç	è	í	^	û	à	ò	è	à	à
SWED/FIN	#	×	é	ä	ö	å	ü	è	ä	ö	å	ü

\*This chart contains elongated proportional characters for greater size and clarity. Refer to Figure 2-7 for switch settings to select country.



### 3.5 ASCII CROSS-REFERENCE

Table 3-4 provides a numeric cross-reference of the 128 ASCII codes. ASCII is the American Stan-

dard Code for Information Interchange. Note that some characters may vary, depending on the printer model or country character set. Refer to other tables for specific characters.

Table 3-4 Numeric Cross-Reference for ASCII Codes

00963

HX	DEC	OCT	BINARY	ASCII	HX	DEC	OCT	BINARY	ASCII	HX	DEC	OCT	BINARY	ASCII
HX	DEC	OCT	BINARY	ASCII	HX	DEC	OCT	BINARY	ASCII	HX	DEC	OCT	BINARY	ASCII
00	0	000	0000000	NULL	2B	43	053	0101011	+	56	86	126	1010110	V (UC)
01	1	001	0000001	SOH	2C	44	054	0101100	,	57	87	127	1010111	W (UC)
02	2	002	0000010	STX	2D	45	055	0101101	-	58	88	130	1011000	X (UC)
03	3	003	0000011	ETX	2E	46	056	0101110	.	59	89	131	1011001	Y (UC)
04	4	004	0000100	EOT	2F	47	057	0101111	/	5A	90	132	1011010	Z (UC)
05	5	005	0000101	ENQ	30	48	060	0110000	0 zero	5B	91	133	1011011	[ open brkt
06	6	006	0000110	ACK	31	49	061	0110001	1 one	5C	92	134	1011100	\ left slash
07	7	007	0000111	BEL	32	50	062	0110010	2 two	5D	93	135	1011101	] close brkt
08	8	010	0001000	BS	33	51	063	0110011	3 three	5E	94	136	1011110	^ circumflex
09	9	011	0001001	HT	34	52	064	0110100	4 four	5F	95	137	1011111	__ underline
0A	10	012	0001010	LF	35	53	065	0110101	5 five	60	96	140	1100000	`grave
0B	11	013	0001011	VT	36	54	066	0110110	6 six	61	97	141	1100001	a (lc)
0C	12	014	0001100	FF	37	55	067	0110111	7 seven	62	98	142	1100010	b (lc)
0D	13	015	0001101	CR	38	56	070	0111000	8 eight	63	99	143	1100011	c (lc)
0E	14	016	0001110	SO	39	57	071	0111001	9 nine	64	100	144	1100100	d (lc)
0F	15	017	0001111	SI	3A	58	072	0111010	:	65	101	145	1100101	e (lc)
10	16	020	0010000	DLE	3B	59	073	0111011	;	66	102	146	1100110	f (lc)
11	17	021	0010001	DC1	3C	60	074	0111100	<	67	103	147	1100111	g (lc)
12	18	022	0010010	DC2	3D	61	075	0111101	=	68	104	150	1101000	h (lc)
13	19	023	0010011	DC3	3E	62	076	0111110	>	69	105	151	1101001	i (lc)
14	20	024	0010100	DC4	3F	63	077	0111111	?	6A	106	152	1101010	j (lc)
15	21	025	0010101	NAK	40	64	100	1000000	@	6B	107	153	1101011	k (lc)
16	22	026	0010110	SYN	41	65	101	1000001	A (UC)	6C	108	154	1101100	l (lc)
17	23	027	0010111	ETB	42	66	102	1000010	B (UC)	6D	109	155	1101101	m (lc)
18	24	030	0011000	CAN	43	67	103	1000011	C (UC)	6E	110	156	1101110	n (lc)
19	25	031	0011001	EM	44	68	104	1000100	D (UC)	6F	111	157	1101111	o (lc)
1A	26	032	0011010	SUB	45	69	105	1000101	E (UC)	70	112	160	1110000	p (lc)
1B	27	033	0011011	ESC	46	70	106	1000110	F (UC)	71	113	161	1110001	q (lc)
1C	28	034	0011100	FS	47	71	107	1000111	G (UC)	72	114	162	1110010	r (lc)
1D	29	035	0011101	GS	48	72	110	1001000	H (UC)	73	115	163	1110011	s (lc)
1E	30	036	0011110	RS	49	73	111	1001001	I (UC)	74	116	164	1110100	t (lc)
1F	31	037	0011111	US	4A	74	112	1001010	J (UC)	75	117	165	1110101	u (lc)
20	32	040	0100000	SP space	4B	75	113	1001011	K (UC)	76	118	166	1110110	v (lc)
21	33	041	0100001	! exclam	4C	76	114	1001100	L (UC)	77	119	167	1110111	w (lc)
22	34	042	0100010	" quotes	4D	77	115	1001101	M (UC)	78	120	170	1111000	x (lc)
23	35	043	0100011	# number	4E	78	116	1001110	N (UC)	79	121	171	1111001	y (lc)
24	36	044	0100100	\$ dollar	4F	79	117	1001111	O (UC)	7A	122	172	1111010	z (lc)
25	37	045	0100101	% percent	50	80	120	1010000	P (UC)	7B	123	173	1111011	{ op brace
26	38	046	0100110	& &ampsnd	51	81	121	1010001	Q (UC)	7C	124	174	1111100	vert rule
27	39	047	0100111	' acute	52	82	122	1010010	R (UC)	7D	125	175	1111101	} cl brace
28	40	050	0101000	( op paren	53	83	123	1010011	S (UC)	7E	126	176	1111110	— overscore
29	41	051	0101001	) cl paren	54	84	124	1010100	T (UC)	7F	127	177	1111111	DEL
2A	42	052	0101010	* asterisk	55	85	125	1010101	U (UC)					
				HX DEC OCT BINARY ASCII					HX DEC OCT BINARY ASCII					



### 3.6 INPUT AND OUTPUT SIGNALS

**DATA STROBE**—The data strobe is a negative-going signal which transfers data from the host device to the printer logic. The pulse duration must be one microsecond minimum. The leading and trailing edges of the data strobe and input data must be as shown in Figure 3-3.

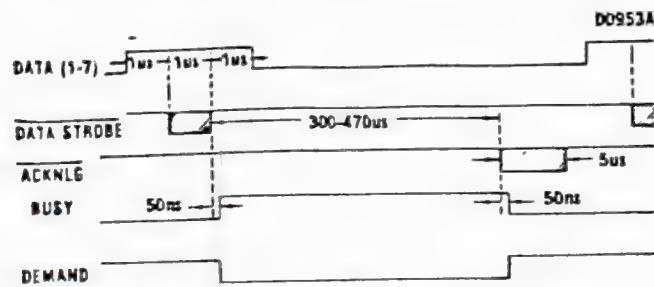


Figure 3-3 Interface Timing Diagram

**DATA BITS DB1-DB7**—Data bits 1 through 7 contain ASCII character and control code information. Data bit levels are positive true logic (+5V = logic1).

**ACKNLG (Pin 19)**—Acknowledge is a negative-going pulse that informs the host device that the printer logic has received and processed the last

code sent, and that another code may be sent. If the printer logic receives a CR (Carriage Return) code or if the buffer becomes full, Acknowledge does not occur until after the line is printed or until the line feed buffer has room for more line feeds.

**BUSY (Pin 21)**—Busy is a positive-going signal which inhibits data transmission from the host. Busy goes positive on the trailing edge of Acknowledge. No data can be sent by the host when Busy is high.

**DEMAND (Pin 36)**—Demand is the inverse of Busy. When Demand is high, data can be transmitted by the host.

**+5V SIGNAL (Pin 35)**—The +5V Signal indicates to the host device that the printer power is on and the logic supply is at the correct voltage.

**SELECT (Pin 25)**—When the front panel switch is in the ONLINE position, SELECT sends a positive-going level to the host to prepare the transmission of data to the printer. A Paper Empty situation de-selects the printer to inhibit host transmission until paper is replenished.

Table 3-5 Control Codes

MNEMONIC	DECIMAL	OCTAL	HEXADECIMAL	FUNCTION
LF	10	012	0A	Full Line Feed Forward
CR	13	015	0D	Print Command
FF	12	014	0C	Top of Form (66 lines)
ESC, SOH	27, 01	033, 011	1B, 01	1 Dot Space
ESC, STX	27, 02	033, 002	1B, 02	2 Dot Spaces
ESC, ETX	27, 03	033, 003	1B, 03	3 Dot Spaces
ESC, EOT	27, 04	033, 004	1B, 04	4 Dot Spaces
ESC, ENQ	27, 05	033, 005	1B, 05	5 Dot Spaces
ESC, ACK	27, 06	033, 006	1B, 06	6 Dot Spaces
ESC, LF	27, 10	033, 012	1B, 0A	Full Line Feed Reverse
ESC, SO	27, 14	033, 016	1B, 0E	Start Elongated Print
ESC, SI	27, 15	033, 017	1B, 0F	Stop Elongated Print
ESC, DC1	27, 17	033, 021	1B, 11	Select Proportional
ESC, DC3	27, 19	033, 023	1B, 13	Select 10 cpi Monospaced
ESC, DC4	27, 20	033, 024	1B, 14	Select 16.7 cpi Monospaced
ESC, FS	27, 28	033, 034	1B, 1C	Half Line Feed Forward
ESC, RS	27, 30	033, 036	1B, 1E	Half Line Feed Reverse
ESC, %, 0	27, 37, 48	033, 045, 060	1B, 25, 30	Enable Graphics
SI	15	017	0F	Start Underline
SO	14	016	0E	Stop Underline
BS*	08	010	08	Backspace

\*BS must be followed by a number (1 to 126) that defines the dot spaces to Backspace.



### 3.7 HOST-GENERATED CONTROL CODES

**SUMMARY**—Control codes are sent to the printer along with character codes via the input data lines. Control codes are interpreted as instructions by the printer. Table 3-5 contains a summary of the control codes and sequences recognized by the printer. Each of the codes is described in detail in the following paragraphs.

**LINE FEED**—Each LF code received by the printer causes the paper to advance one line (one-sixth inch). Consecutive line feeds are received at the character code rate, but the first LF code is acted upon immediately and subsequent LF codes are counted, pending execution by the roller stepper motor. As each LF is executed, the count is decremented until all LF codes are executed and the Line Feed Counter has a count of zero. If a stream of LF codes causes the count to be 255, the Busy signal stays active until the count is decremented (by one). Whenever an LF code is sent after text, the text is printed before the LF code(s) is executed, and text following the LF code will be printed on the line below. Note that LF codes do not reset the character count (or dot position count) thus, text following LF codes will not be printed starting at the left margin unless a CR code is sent prior to the LF code.

**CARRIAGE RETURN**—A CR code is a print command and carriage-return function. Receipt of a CR code causes immediate printing of characters in the character buffer, then the carriage returns to the left margin and the character count (or dot position count) is reset to zero. The printer logic generates a CR code on a buffer full condition. Buffer full equals 80 characters in 10 cpi monospaced mode, or 132 characters in 16.7 cpi monospaced mode, or 1186 dot positions in proportional spaced (or mixed proportional spaced and 16.7 cpi monospaced mode).

**SPACING FOR JUSTIFICATION**—Right justification of the proportional or 16.7 cpi monospaced characters may be accomplished using spacing commands ESC, SOH (1 dot space); ESC, STX (2 dot spaces); ESC, ETX (3 dot spaces); ESC, EOT (4 dot spaces); ESC, ENQ (5 dot spaces) and ESC, ACK (6 dot spaces). The host device must provide the appropriate control codes so that the printed text is right justified at the desired line measure up to 8 inches. Note that after 1185 dot positions, the next character received forces a CR code to end the line. Right justification is not recommended for 10 cpi monospaced.

**FULL LINE FEED REVERSE**—ESC, LF activates one line feed (one-sixth inch) in reverse. Text prior to the ESC, LF code sequence is printed before execution of the reverse line feed. The character count (or dot position count) is not changed; thus, characters following ESC, LF will be printed one line above the previous text.

**ELONGATED CHARACTERS**—An ESC, SO code causes all subsequent characters to be printed double width (elongated). The reception of an ESC, SI code sequence or end of a print line terminates elongated characters. Elongated character start and stop (ESC, SO; ESC, SI) may be entered any number of times within a line and can be used with 10 cpi monospaced, 16.7 cpi monospaced and proportional character sets.

**SELECT PROPORTIONAL**—ESC, DC1 code sequence selects the proportional set to begin a line (terminating the present character set) or may be sent by the host in a line containing 16.7 cpi monospaced for style mixing. The logic will accommodate mixing of proportional and 16.7 cpi monospace, but 10 cpi mixing is not recommended. Proportional characters are terminated by selecting another character set (ESC, DC3 or ESC, DC4).

**SELECT: 10 CPI MONOSPACED**—The primary character set is 10 cpi monospaced, selected by the printer logic during initialization, or by ESC, DC3. The selection of the 10 cpi character set should be done only at the beginning of the line, and the other two sets should not be mixed with it. 10 cpi monospaced is terminated by selecting another character set (ESC, DC1 or ESC, DC4) at the beginning of a new line.

**SELECT 16.7 CPI MONOSPACED**—When ESC, DC4 is received, all following text will be printed in 16.7 cpi monospaced, providing a 132 character-per-line capability. If desired, ESC, DC1 may be sent within the same line to set proportional characters for style mixing. 16.7 cpi monospaced characters may be terminated by selecting another character set (ESC, DC1 at any point; ESC, DC3 at the beginning of the next line).

**HALF LINE FEED FORWARD**—The receipt of an ESC, FS sequence causes immediate printing of text, then the paper is advanced one-half line (one-twelfth inch). A new baseline is created for any text that follows; thus, this function can be used for subscript characters. The original



baseline can be reinstated using an ESC, RS code sequence; the subscript characters will be printed, then the paper will move one-half line in reverse, back to the original baseline.

**HALF LINE FEED REVERSE**—ESC, RS causes immediate printing of previous text, then the paper is moved in reverse one-half line (one-twelfth inch). A new baseline is created for any text that follows; thus, this function can be used for superscript characters. The original baseline can be reinstated using an ESC, FS code sequence; the superscript characters will be printed, then the paper will move one-half line forward (to the original baseline).

**START UNDERLINE, STOP UNDERLINE**—Receipt of an SI code causes all following characters to be underlined. Underlining is accomplished by driving pin 9 to create a continuous, unbroken line until an SO code is received, which terminates the underlining. End of printed line does not terminate underlining. Proportional descenders will touch the underline, as they are partly formed by the 9th pin. Monospaced 10 cpi and 16.7 cpi character descenders are above the underline.

**BACKSPACE N DOT POSITIONS**—The printer may be backspaced from 1 to 126 dot positions by the BS, "N" sequence. "N" is a 7-bit digital value from 0000001 to 1111110 to define the backspace number. The receipt of BS, "N" causes immediate printing of previous text, the carriage returns to the left margin then moves out to the new dot position. If greater than 126 dot position backspace is desired, consecutive BS, "N" codes may be sent. If "N" exceeds the present dot position, the character pointer is reset to zero. If BS, NULL (N = 0) is sent, no operation takes place; the code sequence is ignored (NO-OP). BS, "N" cannot be sent after the 80th character (10 cpi), 132nd character (16.7 cpi) or 1186th dot position, as a buffer full condition causes the line to be terminated and printed automatically.

**BACKSPACING CHARACTERS**—For backspacing of a character or space, the code sequences for the three basic character sets are shown in Table 3-6. The second number in each command represents the dot width of a character or space for that character set. To backspace for elongated characters, this number must be doubled.

**TOP OF FORM**—Receipt of a FF (Form Feed) code causes the printer to advance paper one form length (66 lines; 11 inches; 279 mm) for domestic units and either 66 lines or 72 lines (12 inches; 305 mm) for international units.

**SELECT GRAPHICS**—Receipt of the sequence ESC, %, 0 activates the graphics program. Dot resolution for graphics is 75 dots per inch horizontal, and 72 dots per inch vertical. 594 bytes of graphic data make a complete line (8 inches; 203 mm) and the printer software forces one-half line feed and a carriage return (with Auto Line Feed enabled). Graphics is terminated by a proper escape sequence such as ESC, DC1 (select proportional mode).

### 3.8 PROGRAMMING CONSIDERATIONS

**SUMMARY**—The printer is controlled by the host device which must be programmed to provide the proper instructions to the printer for desired outputs. The following is a summary of the items which should be considered when programming the host device.

- When the printer is turned on, normal 10 cpi monospaced characters are automatically selected.
- 10 cpi monospaced characters cannot be intermixed with proportional or condensed characters in the same line.
- The use of justification codes with 10 cpi monospaced characters is not recommended.
- Elongated characters are automatically terminated at the end of a line.

Table 3-6 Backspacing Characters

CH SET	DOTS	CODE	HEX	DECIMAL	OCTAL	BINARY
10 cpi	10	BS, 10	08, 0A	08, 10	10, 12	0001000, 0001010
16.7 cpi	9	BS, 9	08, 09	08, 09	10, 11	0001000, 0001001
Prop*	6-18*	BS, N*	08, N*	08, N*	10, N*	0001000, xxxxxxx*

\*For proportional character dot widths, refer to Table 3-2.



- Underline is NOT terminated at the end of a line and continues until a terminating command (SO) is sent by the host device.
- When the auto line feed after carriage return function is enabled the print head moves to left margin after printing, then paper is advanced one line.
- When the auto line feed after carriage return is disabled the print head moves to the left margin after printing, but paper is NOT advanced. When in this mode all carriage return (CR) commands should be immediately followed by a line feed command to prevent overprinting.
- Half line feed commands (forward or reverse) cause printing prior to the line feed. The print head is returned to the left margin after printing, then moves out to the position where the last character ended.
- Half line feeds cause new character baselines one half space below (forward) or above (reverse) the former baseline. When subsequent data is printed it will be printed on the new baseline.
- Sequential line feeds, partial or full, are logically summed prior to their execution.
- A line feed command (full or half) causes immediate printing of all preceding data in a line prior to execution of the line feed. The print head is moved to the left margin after printing, then moves to the position above or below the last character printed.
- A CR command causes all preceding data in a line to be printed then returns the print head to left margin.
- A backspace control code (BS, "N") cannot be sent after the 80th character (10 cpi), 132nd character (16.7 cpi), or 1186th dot position (proportional) as a buffer full condition would occur causing the line to be printed prior to the receipt of the backspace command.

### 3.9 JUSTIFICATION CODE SEQUENCES—

Proportional or condensed (16.7) character styles may be right justified using a host device program. Right justification is accomplished by adjusting the width of spaces between words and/or characters. The justification control code sequences allow "dot spaces" to be inserted anywhere within a line of data, between words or between characters. The justification control code sequences are listed in Table 3-7.

Line lengths may be extended by inserting dot spaces between words or between characters as desired within a line of data. Line lengths may be compressed by replacing normal spaces (normal space = 7 dot columns) with shorter dot spaces.

The following items must be considered when preparing a host device control program.

**DOT COLUMNS**—Dot column spacing may be calculated from the following values:

- Maximum Line Length = 1185 dots
- Dot Column Density = 150 dots/inch
- Dot Column Width = 0.00666 inches/dot

Note that when preparing host device right-justification programs, the longest line to be considered is 1185 dot columns in length. This is because lines of data sent to the printer which exceed 1185 dot columns in length cause a buffer-full condition in the printer. This results in automatic printing of the line of data, causes loss of print control by the host device, and random lengths of lines may result.

**PROPORTIONAL CHARACTERS**—Proportional characters vary in width from 6 to 18 dot spaces. The host device justification program must accommodate proportional character dot widths. Table 3-2 shows the proportional characters arranged in ascending ASCII code.

Table 3-7 Justification Codes

ASCII	DECIMAL	OCTAL	HEX	FUNCTION
ESC, SOH	27, 01	033, 001	1B, 01	One Dot Space
ESC, STX	27, 02	033, 002	1B, 02	Two Dot Spaces
ESC, ETX	27, 03	033, 003	1B, 03	Three Dot Spaces
ESC, EOT	27, 04	033, 004	1B, 04	Four Dot Spaces
ESC, ENQ	27, 05	033, 005	1B, 05	Five Dot Spaces
ESC, ACK	27, 06	033, 006	1B, 06	Six Dot Spaces



**CONDENSED (16.7 CPI) CHARACTERS**—Condensed (16.7 cpi) characters are formed using a 7 x 8 character matrix. When printing condensed characters the printer electronics automatically adds a two dot intercharacter spaced following each character. For programming purposes, all condensed (16.7 cpi) characters including normal spaces are 9 dot spaces wide. Table 3-2 may be used as a reference for the ASCII codes for each condensed character, but dot widths shown are for proportional characters only.

**MIXED PROPORTIONAL AND CONDENSED CHARACTERS**—Proportional and condensed (16.7 cpi) characters may be intermixed within a line. The host device justification program must be able to accommodate dot column widths for both proportional and condensed characters when they are printed in the same line.

**ELONGATED CHARACTERS**—Elongated characters may be intermixed with normal characters within a line. The dot widths for elongated characters are twice those of normal characters.

### 3.10 GRAPHIC CODES

The graphics program is completely controlled by the host, with the exception of the printer logic forcing a CR (Carriage Return) when the graphic buffer is full (594 codes). Table 3-8 contains all 64 possible graphic code patterns. Graphic codes shown are in decimal and hexadecimal. Each code is graphic data plus 32 decimal.

The host sends ESC, %, 0 followed by graphic data. If 594 graphic codes are sent in one line, the printer software forces a CR (Carriage Return). With Automatic Line Feed enabled, a one-half line feed will follow the carriage return. With the Automatic Line Feed disabled, an overprint will occur unless an LF (10 decimal) is sent after the 594th byte. LF is normally a full line feed, but in the graphic program the software converts LF to one-half line feed to prepare for the next graphic line.

A graphic line of less than 594 bytes can be terminated by sending a CR (13 decimal). The Automatic Line Feed statement above applies here also.

After all graphic data is sent, the graphic program is terminated by any proper ESC sequence.



Table 3-B Graphic Pin Address Codes (Dec, Hex)\*

01059

1	0	32D 20H	●	33D 21H	○	34D 22H	●	35D 23H	○	36D 24H	●	37D 25H	○	38D 26H	●	39D 27H
2	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
3	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
4	●	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
5	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
6	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
1	0	40D 28H	●	41D 29H	○	42D 2AH	●	43D 2BH	○	44D 2CH	●	45D 2DH	○	46D 2EH	●	47D 2FH
2	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
3	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
4	●	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
5	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
6	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
1	0	48D 30H	●	49D 31H	○	50D 32H	●	51D 33H	○	52D 34H	●	53D 35H	○	54D 36H	●	55D 37H
2	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
3	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
4	●	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
5	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
6	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
1	0	56D 38H	●	57D 39H	○	58D 3AH	●	59D 3BH	○	60D 3CH	●	61D 3DH	○	62D 3EH	●	63D 3FH
2	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
3	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
4	●	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
5	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
6	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
1	0	64D 40H	●	65D 41H	○	66D 42H	●	67D 43H	○	68D 44H	●	69D 45H	○	70D 46H	●	71D 47H
2	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
3	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
4	●	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
5	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
6	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
1	0	72D 48H	●	73D 49H	○	74D 4AH	●	75D 4BH	○	76D 4CH	●	77D 4DH	○	78D 4EH	●	79D 4FH
2	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
3	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
4	●	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
5	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
6	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
1	0	80D 50H	●	81D 51H	○	82D 52H	●	83D 53H	○	84D 54H	●	85D 55H	○	86D 56H	●	87D 57H
2	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
3	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
4	●	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
5	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
6	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
1	0	88D 58H	●	89D 59H	○	90D 5AH	●	91D 5BH	○	92D 5CH	●	93D 5DH	○	94D 5EH	●	95D 5FH
2	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
3	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
4	●	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
5	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000
6	0	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000

\* Refer to Table 3-4 for cross reference to other number systems.



# SECTION 4 OPERATION

## 4.1 CONTROLS AND INDICATORS

The printer controls and indicators are illustrated in Figure 4-1 and described in Table 4-1.

## 4.2 OPERATING PROCEDURES

1. Ensure that a ribbon is installed in the printer and an adequate supply of paper has been installed (see paragraph 2.3 for paper installation).
2. Place ONLINE/LOCAL switch in the LOCAL position. This prevents the printer from printing.

### CAUTION

When turning power on or off, the ONLINE/LOCAL switch should always be placed in the LOCAL position to prevent erroneous communications.

3. Place POWER ON/OFF switch in ON position. "Power On" LED should be visible through paper-exit slot.
4. In LOCAL position, the FWD/REV switch may be used for manual line feed.
5. Place ONLINE/LOCAL switch in the ONLINE position. Printer is ready to accept data.
6. To turn printer off, place ONLINE/LOCAL switch in LOCAL position. Then, place POWER ON/OFF switch in OFF position.

Table 4-1 Control and Indicator Functions

INDEX NUMBER	CONTROL/INDICATOR	FUNCTION
1	POWER switch	When set in the ON position, applies power to printer circuits.
2	ONLINE/LOCAL switch	When set in the LOCAL position, prevents printer from printing and keeps printer "off line." When set in the ONLINE position, printer is ready to receive data.
3	FWD/REV Switch	Manual line feed control (LOCAL Position)
4	Red LED	Indicates power is ON (+5 volts). LED is visible through the paper exit slot.
5	Pinch Roll Release Lever	Set in the OPEN position to load paper. NOTE: When using roll paper or single sheets, set lever in the CLOSED position. When using fanfold paper, set lever in the OPEN position.

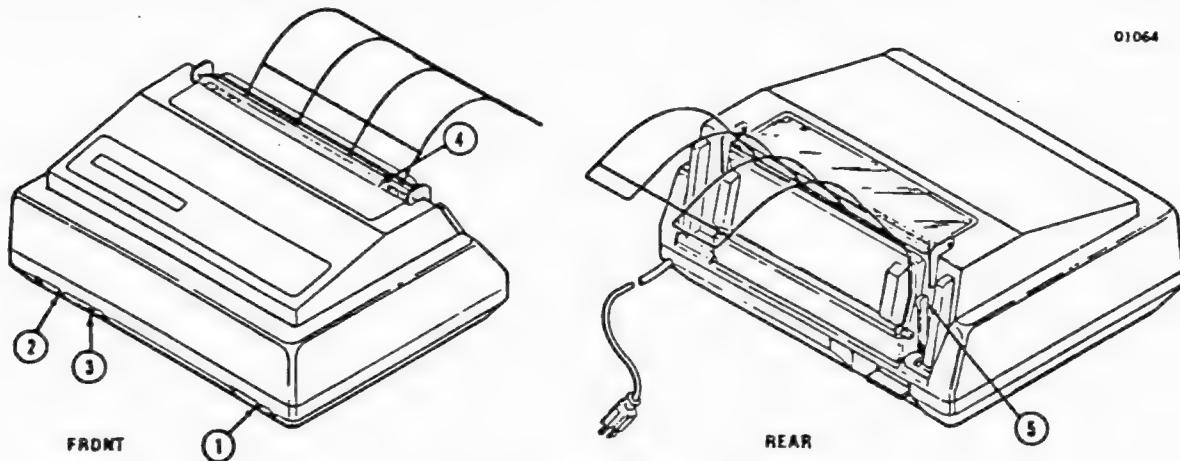
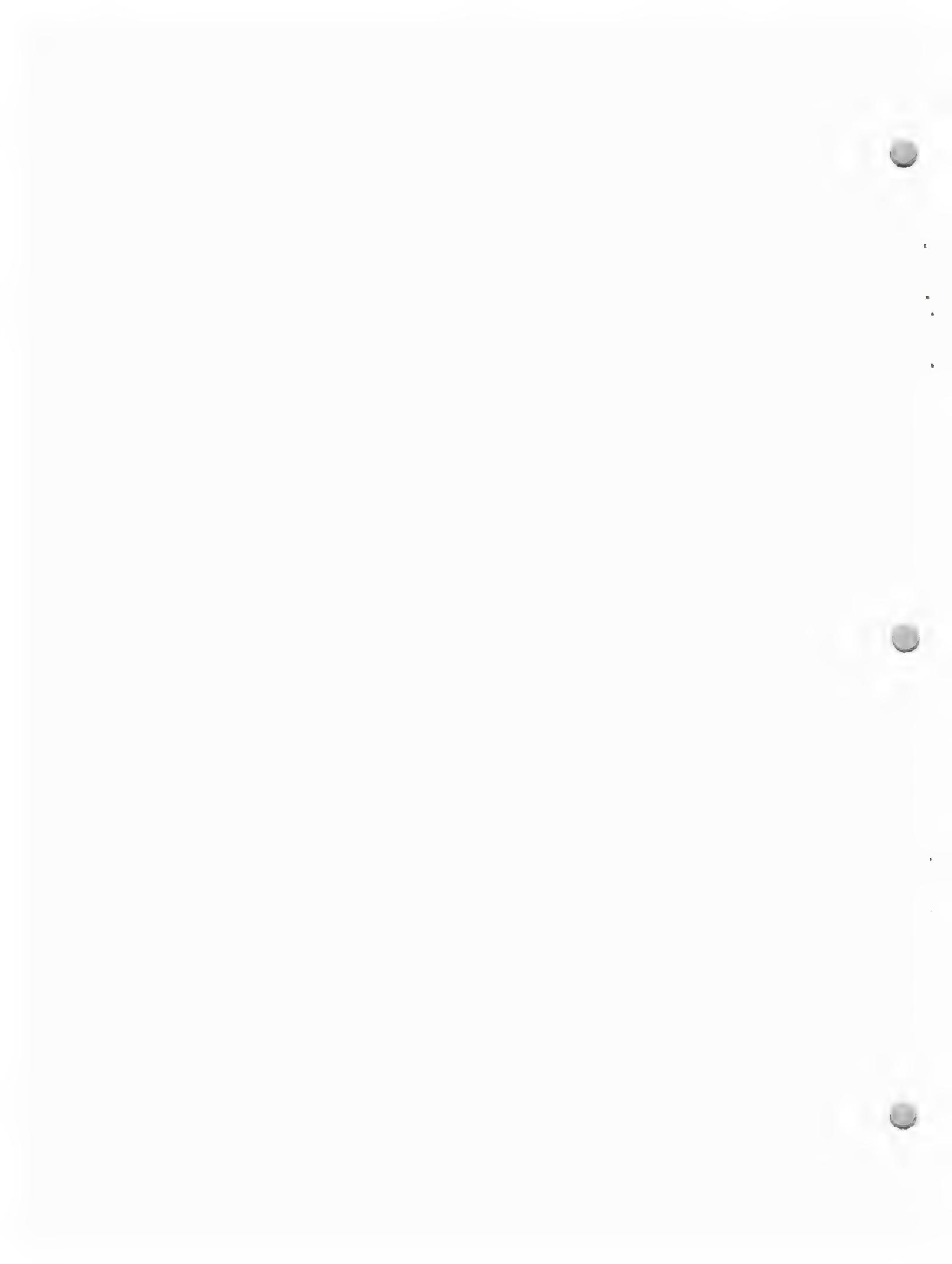


Figure 4-1 Controls and Indicators



#### 4.3 OPERATING NOTES

- Always plug printer into a 3-wire grounded outlet.
- Place printer on a typewriter pad for quieter operation.
- Do not place objects on any part of printer.
- Do not subject printer to: temperatures below +40°F (4°C) during operation; a sudden

change in temperature; dust; moisture; or extreme shock.

- Use only a dry, soft cloth to clean printer surfaces. Do not use harsh detergents or chemicals.
- Avoid touching face of printhead when handling paper or changing ribbons.
- Periodically clean ink build-up from ribbon guide path and remove paper dust from interior.



# SECTION 5

## OPERATOR MAINTENANCE

### 5.1 PREVENTIVE MAINTENANCE (P.M.)

Routine preventive maintenance should be performed at regular intervals to insure satisfactory performance of the printer. Preventive maintenance consists of periodic cleaning, inspection, and lubrication. The recommended preventive maintenance and suggested frequencies are shown below. The preventive maintenance may be required more or less frequently than indicated depending upon printer application, operating environment and type of paper used.

#### WARNING

The power plug must be removed from the power outlet before performing this procedure; otherwise, a potential shock hazard exists in the area being serviced.

#### CAUTION

Care must be taken when performing the preventive maintenance procedures outlined in Table 5-1. Damage to the printer resulting from performing these procedures may void the warranty.

Table 5-1 Preventive Maintenance

ITEM	FREQUENCY	PROCEDURE
Internal Inspection	Each Ribbon Change	Visually inspect interior of printer for loose wires, connectors, and hardware, chafing of cables, and worn or damaged parts.
Print Head and Carriage	Each Ribbon Change	After removing ribbon, use a light-bristle brush to carefully remove dust and residue from print head and carriage assembly.
Print Head	Each Ribbon Change	Using a lint-free cloth gently remove all dried ink from the front of the print head.
Carriage Guide Bars	6 Months	Move print head to left side of printer. Apply several drops of lubricating oil to a lint-free cloth and lightly rub carriage guide bars to remove any build up of residue. Move print head to right side of printer and repeat procedure.
Paper Drive Roller	6 Months	Using a lint-free cloth clean the paper drive roller and plate bushings. After cleaning, apply one drop of lubricating oil to the paper roller and plate bushings. Cycle the paper roller using the thumbwheels to allow oil to seep into bushings.
External Cleaning	As Required	Clean all external surfaces using a mild detergent and a lint-free cloth.

### 5.2 TROUBLESHOOTING

See WARNING in paragraph 5.1. The troubleshooting guide, Table 5-2 lists some malfunctions which may occur, the probable causes and the remedies. If the equipment remains inoperative after performing the remedies

indicated, the equipment should be serviced by qualified service personnel (Centronics Factory Service Center or Authorized Service Dealer personnel.) Note that the warranty is voided if attempts to repair the printer result in further damage.



Table 5-2 Troubleshooting Guide

TROUBLE	PROBABLE CAUSE	REMEDY
Print too light.	Print Head release lever open or partially open.	Rotate print head release lever clockwise to normal printing position (see Figure 2-5).
Worn or defective ribbon	Pinch roller release lever in open position.	Replace ribbon per paragraph 2.4.
Roll Paper/Single Sheet paper does not advance.	Ribbon twisted or improperly loaded.	Pull pinch roller release lever forward to closed position.
Ribbon does not feed properly.	Ribbon drive rollers not engaged properly.	Check ribbon threading diagram (Figure 2-6) and correct as required.
Printer completely inoperative.	AC input plug not connected.	Open and release driven roller. Rotate driven roller clockwise to assure proper movement of ribbon.
Paper Jam		Connect AC input plug to power source.
Fuse F3 blown.		Set POWER switch to OFF position and carefully clear paper jam. Check condition of ribbon before setting POWER switch to ON position.
Cable between input device and printer not connected.		Check if "Power On" LED is lit by looking down through paper exit slot. If not lit, replace fuse F3. (Refer to Disassembly Procedures paragraph 5.4).
ONLINE switch in LOCAL position.		Check that connectors at both ends of data input cable are properly connected to mating connectors.
Paper supply exhausted.		Place switch in ONLINE position.
Power applied/data sent — printer does not print.		Replenish paper.

### 3.3 REMOVAL OF COVER ASSEMBLIES

In order to visually inspect the interior of the printer and to replace fuse F3, it is necessary to remove the cover assemblies. Refer to Figure 5-1 and perform the following:

#### WARNING

The power plug must be removed from the power outlet before performing the preventive maintenance procedures; otherwise, a potential shock hazard exists in the area being serviced.

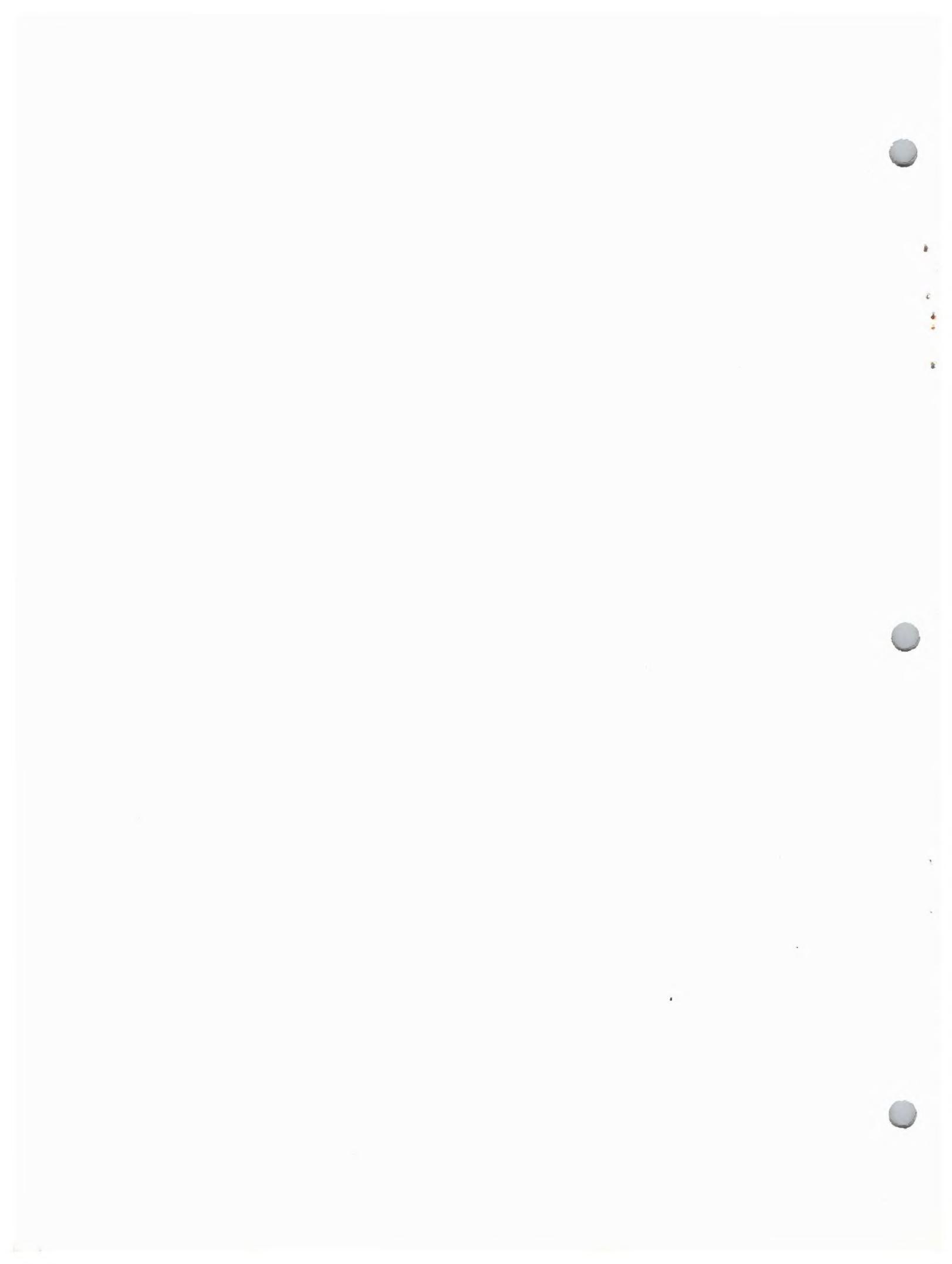
#### CAUTION

Performance of the following procedure by unauthorized personnel during the warranty period will void the warranty. Refer to the Warranty for details.

1. Place POWER ON/OFF switch in OFF position and disconnect AC input plug from power source. Disconnect data input connector.
2. Remove top cover by lifting rear edge until latches are clear of body cover and then slide cover towards rear of printer to disengage front clips.
3. Unthread the ribbon from the print head/carriage assembly, then take up slack in ribbon by turning ribbon drive roller knob clockwise.
4. Release the two Phillips-head screws at the front of the printer and the three Phillips-head screws at the rear of the printer using a No. 1 Phillips screwdriver.
5. Gradually raise the body cover until there is enough room to reach under the front of the cover.
6. Reach under the body cover and disconnect the ribbon drive motor cable connector from connector J001 on the logic pc board.
7. Keep the body cover level to prevent ribbon from unthreading and set cover to one side.
8. To reassemble printer, reverse procedure.

### 5.4 FUSE REPLACEMENT

See WARNING and CAUTION in paragraph 5.3.



Fuse F3 (line fuse) is located on the forward right-hand corner of the logic P.C. board adjacent to the power transformer and POWER ON/OFF switch. Refer to Figure 5-1 and proceed as follows:

1. Disassemble cover assemblies per paragraph 5.3 to gain access to logic P.C. board mounted to the base cover.
2. Loosen screw, located on right side of transformer using a Phillips screwdriver.
3. Remove the clear plastic high voltage shield covering the fuse and AC input circuits.
4. Remove and replace the defective fuse with one of the same value:
  - 739-1; 1A Slow Blow
  - 739-2; 0.5A Slow Blow
5. Reinstall the high voltage shield. Make sure that the slotted portion of the shield is under the flat washer.
6. Tighten the Phillips-head screw to secure the shield.
7. Reassemble the cover assemblies.

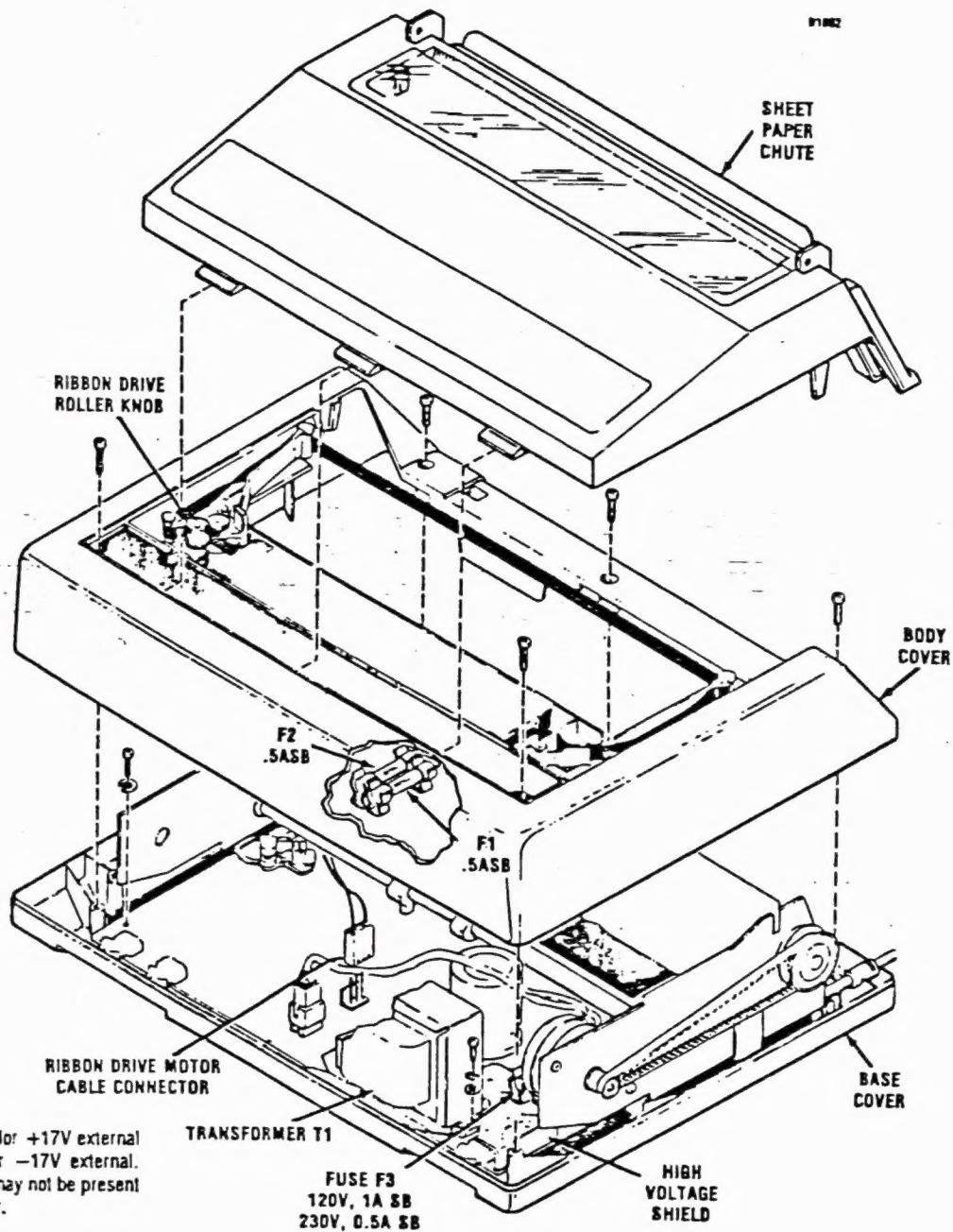


Figure 5-1 Removal of Cover Assemblies

